AMENDMENT TO THE CLAIMS

1. (Currently Amended) Treatment process for a mix of materials originating from residues from grinding of consumable articles at the end of their lives into fragmented form, to pre-concentrate this mix into recoverable materials and at least partly eliminate materials contaminating the recoverable materials, the ~~said~~ mix to be treated ~~comprising:~~includes:

a fraction of recoverable materials~~, consisting of~~having non-expanded synthetic polymer materials with various natures and/or compositions and/or shape factors, in the form of fragments varying from a rigid state to a flexible state,

fractions of contaminating materials formed from mineral materials and/or metallic materials and/or organic materials other than non-expanded polymer materials and/or synthetic polymer materials in an expanded state,

~~characterised in that it comprises~~the process comprising:

a) ~~a first mechanical separation step~~mechanically separating by screening and/or shape factor to at least partly extract the fractions of contaminating mineral materials~~,~~ from the mix of ~~fragmented~~ materials,

b) ~~an aeraulic separation step~~aeraulically separating by gas flow the mix of materials ~~, comprising one input for the mix of materials~~ originating from step a)~~,~~ from which the mineral materials fraction has been at least partly removed so as to output~~, and three outputs for extraction of separated material fractions in which the~~a first fraction (b1) ~~consists of~~that includes a fraction of ultra-lightweight and/or expanded synthetic polymer materials, ~~the~~a second fraction (b2) ~~consists of~~that includes a fraction of heavy materials ~~present in the mix~~ and ~~the~~a third fraction (b3) ~~consists of~~that includes a fraction of synthetic polymer materials to be recovered, in fragmented form varying from a rigid state to a flexible state, .

c) ~~a step to~~ grinding the third fraction (b3) of recoverable polymer materials originating from step b), to ~~the~~ a liberation mesh of contaminating materials included in, adhering to or assembled with fragments of the third fraction of polymer materials to be recovered,

d) ~~a second mechanical separation step~~mechanically separating by screening and/or ~~aeraulic separation~~aeraulically separating by gas flow~~, separating~~ the third fraction of synthetic polymer materials to be recovered originating from the grinding step c) to at least partly eliminate the fraction of contaminating materials released during grinding and to extract

~~the~~a fraction of recoverable materials forming the required mix, pre-concentrated into recoverable materials, and still containing contaminants.

2. (Currently Amended) Process according to claim 1, ~~characterised in that a density separation step in an aqueous medium of~~separating the fraction of recoverable materials originating from step d) ~~is set up~~ in an aqueous medium~~, this separation being made~~ at a threshold density «ds» chosen to obtain two fractions of recoverable materials preselected based on the ~~chosen~~ threshold density ~~threshold~~ «ds» and pre-concentrated in recoverable materials still containing contaminating materials.

3. (Currently Amended) Process according to ~~either~~ claim 1 ~~or 2~~, ~~characterised in that~~wherein the mix of materials to be treated contains non-expanded thermoplastic and thermosetting synthetic polymer materials as recoverable materials to be pre-concentrated~~,~~ that ~~are present in objects at the end of their lives and originating~~ originate from destructive grinding.

4. (Currently Amended) Process according to ~~any one of~~ claims 1 ~~to 3~~, ~~characterised in that~~wherein the fraction of ~~the~~ recoverable materials are in the form of fragments for which the largest dimension is not more than 250 mm~~, and preferably not more than 200 mm~~.

5. (Currently Amended) Process according to ~~any one of~~ claims 1 ~~to 4~~, ~~characterised in that~~wherein the mix of materials to be treated is subjected to separation by screening and/or shape factor according to step (d), ~~the~~a largest dimension of ~~the~~ a screening mesh being equal to not more than 25 mm ~~and preferably between 1 and 15 mm~~.

6. (Currently Amended) Process according to claim 5, ~~characterised in that~~wherein the ~~separation~~ separating by screening and/or shape factor is made in a calibrated separation mesh device~~, chosen from the group consisting of~~ the calibrated separation mesh device includes a vibrating screen devices ~~or~~and rotating devices with a cylindrical separation surface.

7. (Currently Amended) Process according to ~~any one of~~ claims 1 ~~to 6~~, ~~characterised in that~~wherein the recoverable materials originating from step (a) from which some of the contaminating materials have been removed, are subjected to aeraulic separation by suction and/or blowing in a single aeraulic separation means comprising at least two specific aeraulic separation zones, the first specific aeraulic separation zone simultaneously supplying the ~~said~~ means of aeraulic separation into a flow of materials to be separated for which the input flow is subjected to an early aeraulic separation as it enters the said zone with immediate separation of the first fraction (b1) of ultra-lightweight materials to be eliminated and the immediate output of

the ~~said~~ first fraction (b1) using the aeraulic separation means, the other specific aeraulic separation zone provided with a screening zone and also subjected to a gas flow that treats the mix of heavy and ~~contaminating materials~~second fraction (b2) and the ~~recoverable lightweight materials~~third fraction (b3) originating from the first specific zone, the gas flow separating the ~~lightweight recoverable materials~~third fraction (b3) and entraining it to an exit from the aeraulic separation means, while the ~~contaminating heavy materials~~second fraction (b2) is separated from the third fraction (b3) by gravity and is eliminated from the aeraulic separation means through an appropriate exit.

8. (Currently Amended) Process according to claim 7, ~~characterised in that~~wherein the aeraulic separator with two specific separation zones ~~may be chosen from the group composed of~~ includes modular separators-cleaners-calibrators comprising screens and double suction.

9. (Currently Amended) Process according to ~~any one of~~ claims 1 ~~to 6~~, ~~characterised in that~~ wherein the recoverable materials originating from step (a) ~~, from which the major part of contaminating materials has been eliminated,~~ are subjected to aeraulic separation by suction and/or blowing into ~~two~~ a first aeraulic separation means and a second aeraulic separation means installed in series.

10. (Currently Amended) Process according to claim 9, ~~characterised in that~~wherein the first aeraulic separation means receives ~~the~~ an input flow of materials to be separated into fractions of contaminating and recoverable materials originating from step a), treats this flow in two fractions, such that the first fraction (b1) of ultra-lightweight materials is extracted through ~~the~~a top part of the said first aeraulic separation means, while a mix of the second fraction (b2) of contaminating heavy material and the third fraction (b3) of lightweight materials to be recovered is extracted through ~~the~~ a bottom part of the ~~said~~ the first aeraulic separation means, and is then added in the second aeraulic separation means, the second fraction (b2) of contaminating heavy materials being eliminated through the bottom part of the second aeraulic separation means while the third fraction (b3) of materials to be recovered is extracted from the ~~said~~ second aeraulic separation means.

11. (Currently Amended) Process according to claim 9, ~~characterised in that~~wherein the first aeraulic separation means receives ~~the~~ an input flow of materials to be separated into fractions of contaminating and recoverable materials originating from step a), treats the flow in two fractions such that the second fraction (b2) of contaminating heavy materials is extracted

through ~~the~~ a bottom part of the ~~said~~said the first aeraulic separation means while a mix of the first fraction (b1) of contaminating ultra-lightweight materials and the third fraction (b3) of recoverable lightweight materials is extracted through ~~the~~ a top part of the first aeraulic separation means, and then ~~this~~ a mix of the first fraction (b1) and the third fractions ~~(b1) and~~ (b3) is added into the second aeraulic separation means, the first fraction (b1) of contaminating ultra-lightweight materials being eliminated through the top part of the said second aeraulic separation means, while the third fraction (b3) of recoverable lightweight materials is extracted through the bottom part of the ~~said~~first aeraulic separation means.

12. (Currently Amended) Process according to ~~any one of~~ claims 1 ~~to 11~~, ~~characterised in that~~further comprising screening the first fraction (b1) of contaminating ultra-lightweight materials extracted from the aeraulic separation zone ~~is subjected to an additional step of separation by screening depending on their~~ by a largest dimension and/or ~~their~~a shape factor to separate a fraction formed from materials with dimension smaller than ~~the~~a mesh size of ~~the~~ a screen such as polymer powders, thread and/or film waste, small volumes of foam and a fraction ~~composed~~ including of all foam flakes that would not pass through the screen meshes, and to recover them by an appropriate operation.

13. (Currently Amended) Process according to ~~any one of~~ claims 1 ~~to 12~~, ~~characterised in that~~ further comprising fine grinding the third fraction (b3) of polymer materials to be recovered originating from the aeraulic separation step b), that still contains contaminating materials included in, adhering to or assembled with the polymer materials to be recovered, ~~is subjected to a fine grinding action~~ to reach at least the liberation mesh of contaminating materials contained in the polymer materials to be recovered, to release the ~~said~~ polymer materials to be reused from all contaminating materials.

14. (Currently Amended) Process according to claim 13, ~~characterised in that~~ wherein the liberation mesh of contaminating materials leads to at least fine fragmentation by grinding resulting in polymer particles to be recovered with a largest dimension equal to not more than 50 mm~~, preferably not more than 25 mm, and even better between 1 mm and 15 mm~~.

15. (Currently Amended) Process according to ~~any one of~~ claims 1 ~~to 14~~, ~~characterised in that~~wherein, ~~in the case in which~~when the flow of finely ground materials originating from step c) and input into step d) contains not more than 20% by weight of water, the first fraction, the second fraction, and the third fraction~~various ultra-lightweight, lightweight and heavy material~~

~~fractions in this flow~~ are separated aeraulically in a separation zone comprising at least one aeraulic separation means operating by blowing in and/or suction of a gas flow, ~~this~~the separation zone comprising an input of the mix of materials originating from step c) to be separated and three outputs through which a fraction (d1) of ultra-lightweight polymer and/or expanded materials to be eliminated, a fraction (d2) ~~consisting of~~ of contaminating heavy materials to be eliminated and a fraction (d3) formed of polymer materials to be recovered, this final fraction (d3) forming the flow of recoverable pre-concentrated materials.

16. (Currently Amended) Process according to claim 15, ~~characterised in that~~wherein, when the ~~aeraulic separation zone~~ separating in step d) comprises a single aeraulic separation means, this separation means itself comprises at least two specific separation zones for the materials to be separated, one of the specific aeraulic separation zones being the zone that simultaneously supplies materials to be separated for which the input flow is subjected to an early aeraulic separation as it enters the said zone and immediate exit of the fraction (d1) of ultra-lightweight materials to be eliminated in a gas flow, the other specific aeraulic separation zone, provided with a screening surface and subjected to a gas flow, treats the mix of the fraction (d2) of heavy and contaminating materials and the fraction (d3) of recoverable materials originating from the first specific zone, the gas flow separating the lightweight recoverable materials fraction (d3) and entraining it to an exit from an aeraulic separation means, while the contaminating heavy materials fraction (d2) is separated from the fraction (d3) by gravity and is eliminated from the aeraulic separator through an appropriate exit.

17. (Currently Amended) Process according to claim 15, ~~characterised in that~~wherein, ~~when~~ the separation zone comprises ~~two~~ a first aeraulic separation means and a second aeraulic separation means, the ~~said~~ first and second separation means are installed in series such that at least one output from the contaminating material fractions (d1) and (d2) is located on the first aeraulic separation means.

18. (Currently Amended) Process according to claim 17, ~~characterised in that~~wherein the first aeraulic separation means receives the input flow of materials to be separated into fractions of contaminating and recoverable materials originating from step c), treats this flow in two fractions such that the ultra-lightweight materials fraction (d1) is extracted through the top part of the first aeraulic separation means, while a mix of the fraction (d2) of contaminating heavy materials and the fraction (d3) of materials to be recovered is extracted through the bottom part

of the said aeraulic separation means and ~~this~~ the mix of fractions (d2) and (d3) is added into the second aeraulic separation means, the fraction of heavy materials (d2) being eliminated through the bottom part of the said aeraulic separation means, while the fraction (d3) of materials to be recovered is extracted from step d) to form the fraction pre-concentrated in polymer materials to be recovered.

19. (Currently Amended) Process according to claim 17, ~~characterised in that~~ wherein the first separation means into which the input flow of materials to be separated into fractions of contaminating and recoverable materials originating from step c) treats the flow in two fractions such that the fraction of contaminating heavy materials (d2) is extracted through the bottom part of the said first aeraulic separation means, while a mix of the fractions of contaminating ultra-lightweight materials (d1) and recoverable materials (d3) is extracted through the top part of the said first aeraulic separation means and this mix of ultra-lightweight contaminating materials (d1) and recoverable materials (d3) is then added into the second aeraulic separation means, the fraction of contaminating ultra-lightweight materials (d1) being eliminated through the top part of the second aeraulic separation means, while the recoverable materials fraction is extracted through the bottom part of the said separation means to form the fraction pre-concentrated in polymer materials to be recovered.

20. (Currently Amended) Process according to ~~any one of~~ claims 1 ~~to 14~~, ~~characterised in that in the case in which~~ wherein, when the finely ground materials flow originating from step c) and input into step d) contains not less than 20% by weight of water, a mechanical separation by screening and/or shape factor can be done using a device with a screening means adapted to the shape of fragments of recoverable materials.

21. (Currently Amended) Process according to claim 20, ~~characterised in that~~ wherein the screening means is a screen with a calibrated separation mesh, the largest calibrated mesh dimension being equal to not more than 25 mm~~, and preferably not more than 10 mm~~.

22. (Currently Amended) Process according to ~~any one of~~ claims 1 ~~to 21~~, ~~characterised in that~~wherein the extracted fraction of recoverable polymer materials preferably contains at least 85% by weight of the said recoverable polymer materials.

23. (Currently Amended) Use of fractions pre-concentrated in recoverable polymer materials resulting from ~~any one of~~ claims 1 ~~to 22~~ as input to selective separation processes for the separate extraction of each recoverable polymer.